Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D.C. 20554

In the Matter of	)	
	)	
Unlicensed Use of the 6 GHz Band	)	**ET Docket No. 18-295**
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	**GN Docket No. 17-183**
	)	
	)	

COMMENTS OF MIDCONTINENT COMMUNICATIONS

Midcontinent Communications (Midco) commends the Commission for taking action to more efficiently use the 6 GHz band, provide spectrum for consumers' ever-increasing broadband needs, and close the Digital Divide. We are submitting comments separate from our trade associations[1] to focus on how the U-NII-5 and U-NII-7 bands can best serve fixed wireless operations in rural America. Most importantly, we request that the Commission decline to impose a maximum height requirement for access points in the U-NII-5 and U-NII-7 bands, at least in rural America, and that the Commission increase its proposed client device power limitations, at least for outdoor devices.

[1] Midco is a long-time member of NCTA, the Internet & Television Association, and, after our acquisition of a fixed wireless provider in March of 2018, a member of WISPA, the Wireless Internet Service Providers Association. Additionally, Midco is a member of various multi-stakeholder and research and development organizations including CableLabs, the CBRS Alliance, WInnForum, and the Wi-Fi Alliance.

TABLE OF CONTENTS

I. INTRODUCTION

For more than 85 years, Midco has served the Upper Midwest through a continuing evolution of services from radio, movie theaters, TV, cable, and now high-speed wired and wireless internet and associated services such as data centers and home security systems. We serve the more urban areas of our footprint with fiber, including Gig internet availabity to over 90% of our wired footprint. Using our Midco® Edge Out[2] strategy, we "edge out" that high-speed internet from our fiber backbone in urban areas to rural areas using fixed wireless technology. We use the initial fixed wireless expansion from our wired plant to meet consumers' immediate needs, and then leverage that expansion to justify a wired network buildout in the future. While some rural areas may support that wired build, other, more remote rural areas will continue to be served with a fixed wireless solution.

Key to delivering both our wired and wireless services is spectrum, and, as we know, life in America "runs on unlicnesed spectrum."[3] We know the "explosive demand" for spectrum for both indoor, Wi-Fi needs, and outdoor fixed wireless needs.[4] The Commission's proposal in the U-NII-6 and U-NII-8 bands is crucial to freeing up additional spectrum for Wi-Fi to meet consumers' ever-increasing bandwidth needs, and will be a significant benefit to our consumers on both our wired and wireless plants. Other organizations, including NCTA and the Wi-Fi

[2] Midco has filed or is filing for a trademark of Midco® Edge Out with the United States Patent and Trademark Office, and with the applicable state agencies in our footrpint.

[3] *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Proposed Rulemaking, ET Docket No. 18-295 and GN Docket No. 17-183, FCC 18-147 ("NPRM"), Statement of Commissioner Jessica Rosenworcel ("You may not know it, but your life runs on unlicensed spectrum.").

[4] NPRM ¶ 1.

Alliance, have already provided comments on the U-NII-6 and U-NII-8 bands,[5] and Midco relies on their expertise and advocacy for those bands.

The Commission has also recognized that the 6 GHz band "could promote new technology and services that will advance the Commission's efforts to make broadband connectivity available to all Americans, ***especially those in rural and underserved areas***."[6] In particular, the Commission, through balanced rulemaking, can make the U-NII-5 and U-NII-7 bands fixed wireless heavy lifters, much like the U-NII-3 band, to close the Digital Divide.

We use the U-NII-3 band in our fixed wireless network, and know firsthand its workhorse-like abilities. We use a variety of spectrum bands to provide service to our current 4,400 customers,[7] including over 160 point-to-point U-NII-3 deployments, and over 100 point-to-multipoint U-NII-3 deployments, with more deployments planned. The U-NII-3 band works well in rural America to provide high-speed (including speeds of 100/20 Mbps) and low latency (sub-30 miliseconds) internet access.

Due to the proximity to and similairlity of the U-NII-5 and U-NII-7 bands to the U-NII-3 band, the ecoystem for our equipment, supporting both contiguous and non-contiguous intraband carrier aggregation, already exists. Not only can we deploy U-NII-5 and U-NII-7 equipment

---

[5] *See generally*, Wi-Fi Alliance, Ex Parte Letter, ET Docket No. 18-295, GN Docket No. 17-183, (October 18, 2018); Comments of NCTA, GN Docket No. 17-183, at 2 (Oct. 2, 2017).

[6] NPRM ¶¶ 1, 3.

[7] While our current network has approximately 4,400 customers, Midco has been provisionally awarded approximately $38.9 million in Connect America Fund Phase II ("CAF") funding. *See, e.g.*, Auction 903, Closing Public Notice, Attachment A – Winning Bidder Summary (Aug. 28, 2018). The combination of our CAF buildout and our general Midco® Edge Out strategy will result in a minimum of 400,000 additional homes capable of being passed with fixed wireless service in our footprint.

quickly after the Commission issues an Order in these dockets, but the technology will continue to evolve, allowing us to increase speeds and distances to better serve rural America.

Our comments herein are limited to how the U-NII-5 and U-NII-7 bands could best serve rural America. While many of our suggestions may also be applicable to urban areas, we cannot offer guidance to the Commission on the appropriate rules for urban needs as our current expertise is in rural fixed wireless solutions.

II. DISCUSSION

A. THE U-NII-5 AND U-NII-7 BANDS COULD BETTER CLOSE THE DIGITAL DIVIDE IF THE COMMISSION ALLOWED HIGHER HEIGHTS FOR ACCESS POINTS IN RURAL AMERICA

The Commission could take a big step in closing the Digital Divide by declining to impose any height restriction on access points in rural America or, alternatively, imposing a height restriction of at least 90 meters instead of the proposed 30-meter restriction.[8] A 30-meter restriction severely limits the service area, depriving those in rural America of a reliable internet connection. Moreover, as a practical matter, it is difficult for fixed wireless operators to deploy at 30 meters given the vertical assets available in rural America. Finally, any minimal risk of harmful interference can be managed by instituting a professional installer certification requirement, and through the automated frequency control ("AFC") system.

1. Increasing the maximum access point height would allow providers to increase their service area to close the Digital Divide

The U-NII-3 band has long been a heavy lifter of unlicensed spectrum for fixed wireless operators, especially in rural America. By abolishing or increasing the proposed 30-meter height

[8] NPRM ¶ 51 & n.117. Midco disagrees that using building heights ranging from 5 to 30 meters is appropriate in rural America where vertical assets in a fixed wireless network will typically exceed 30 meters.

restriction, the U-NII-5 and U-NII-7 bands can become additional heavy lifters for rural America with their combined 850 MHz of unlicensed spectrum.

Thompson, ND, is both an example of our Midco® Edge Out strategy and an example of where a higher access point deployment height could serve substantially more customers. Thompson is a city of approximately 1,010,[9] about 10 miles south of Grand Forks, where we have a wired network. We edged out internet service to rural Thompson to meet consumers' immediate needs using fixed wireless with equipment located on the Thompson grain elevator. We wirelessly backhaul that traffic to a vertical asset in Grand Forks that connects to our fiber plant. Our rural Thompson customer base and associated connectivity needs have grown such that we will bring fiber to the elevator to directly connect our wireless customers to our core, wired network.

Increasing the maximum height requirement for the U-NII-5 and U-NII-7 bands would help us maximize the potential of these bands to serve even more rural residents. Figure 1 is a sample propagation from the Thompson grain elevator.[10] The elevator is about 190 feet tall, and is the only available existing vertical asset tall enough to deploy fixed wireless on to serve this community. Assuming that we could actually deploy U-NII-5 or U-NII-7 equipment at 30 meters (an impossibility as this is a

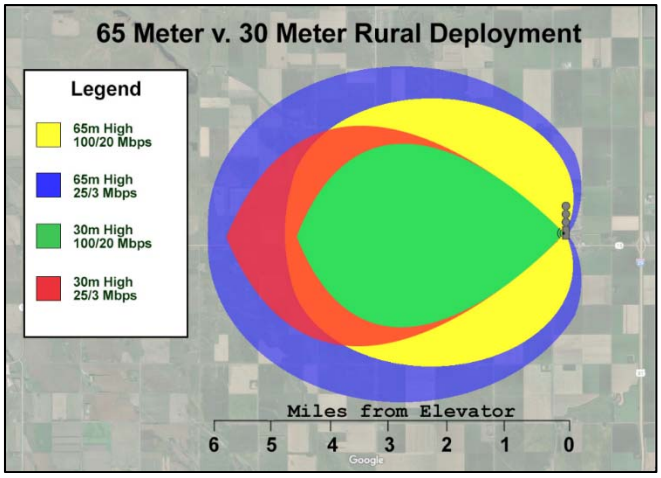

Figure 1: 65 v. 30 Meter Access Point Deployments in the U-NII-5 and U-NII-7 Bands

[9] City of Thompson, ND, https://www.cityofthompsonnd.com/.

[10] We performed these calculations using Tower Coverage software and an LTE protocol.

cement grain elevator, see Section I(B) below), a 30-meter deployment would cover 31 square miles, and 24.8 of those square miles would be able to receive speeds of 100/20 Mbps. A 65-meter deployment, however, would cover 44 square miles, and 35.1 of those square miles would be able to receive speeds of 100/20 Mbps. A 65-meter deployment ***would increase coverage ability by more than 40%.***

An access deployment height of at least 90 meters, however, would provide us with greater flexibility in engineering our network to provide a better line-of-sight, or near-line-of-sight between the access point and the client device. Figure 2 summarizes and simplifies the path analysis models for 30m, 65m, and 90m deployment heights that we provide in the attached Appendix 1. As shown, a higher deployment height allows us to tilt the antennas to better achieve signal levels and provide a clearer line of sight between the access point and client device, all of which increases a customer's speed and upload capacity. A more focalized tilt not only better services our customers but also helps mitigate any risk of harmful interference.

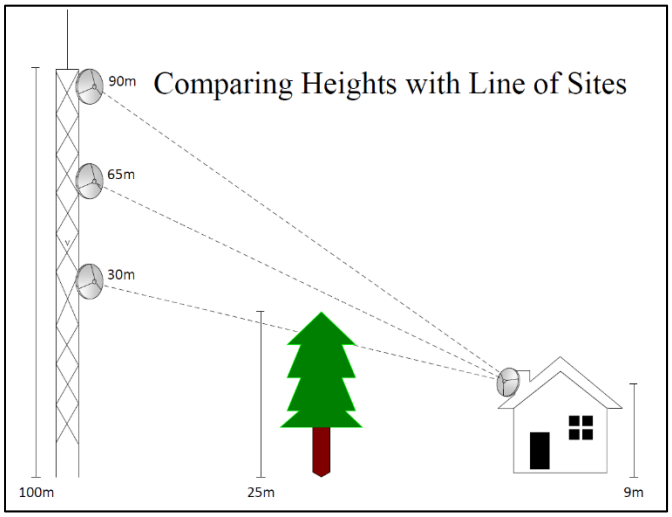

Figure 2: Simplified Path Analysis Models from Appendix 1

2. As a practical matter, deployment at 30 meters is impossible or unnecessarily more expensive than higher deployment heights

In addition to providing better service to customers, a higher deployment height is needed as practical matter given the vertical assets on which fixed wireless equipment is deployed. As with many other rural fixed wireless providers, grain elevators and water towers are crucial vertical assets in our fixed wireless network. Unlike commercial towers that can support deployment at many different heights, grain elevators, water towers, and even tall buildings are structurally limited given their cement and brick construction. In Figure 3, for example, we can only deploy our equipment at the top of the asset given its structural composition and the elevator's use of the grain bins at lower heights. This particular elevator, however, is over 200 feet tall, meaning that we would be prohibited under the Commission's proposed 30-meter height restriction from using the U-NII-5 and U-NII-7 bands to serve this rural community.

Figure 3: Stephen, MN Grain Elevator

Even if we used only commercial towers, the 30-meter restriction would result in increased rental rates. For example, we currently deploy 3.65 GHz equipment (soon to be CBRS equipment) as high as possible on the tower to maximum propagation and service area. To serve more residents at faster speeds, we might deploy one ring (i.e., four sectors) of CBRS equipment and one ring of U-NII-5 / U-NII-7 equipment on a commercial tower at similar heights. Under the Commission's proposed 30-meter height restriction, we would incur double rental rates and an additional structural analysis fee for the lower height deployment, which could potentially

reduce or even eliminate our return on investment in deploying an additional ring of U-NII-5 / U-NII-7 equipment.

3. A network designed using the Commission's proposed rules would minimize any potential risk of harmful interference

Any concerns of a risk of harmful interference can be minimized with a properly engineered fixed wireless network that complies with the Commission's proposed rules. Midco understands the need to protect indoor client devices and incumbents from any harmful interference from access points, especially as we plan on using the U-NII-6 and U-NII-8 bands for our in-home modems, routers, managed Wi-Fi, and other products and services. Given the propagation characteristics and power limits for indoor devices across the U-NII-5, U-NII-6, U-NII-7, and U-NII-8 bands, however, buildings housing indoor client devices will naturally attenuate the signal strength of these lower-powered devices, significantly minimizing any risk of harmful interference from outdoor access points, even at 90-meter or greater deployment heights.

Additionally, the Commission can institute appropriate safeguards to protect against any interference. For example, Midco supports a certified professional installation (CPI) requirement,[11] at least for access points exceeding a 30-meter deployment. We agree that an industry-led or multi-stakeholder organization, such as WInnForum, could take the lead in drafting the professional installation standards, much like in the CBRS band.[12] While a CPI requirement may marginally increase costs of deployment, the cost ensures that networks are professionally engineered and deployed to reduce any concerns of harmful interference.

---

[11] NPRM ¶ 52.

[12] *Id.*

While concerns of satellite operators in the 6 GHz band should already be alleviated by the fact that their satellites typically operate some 36,000 kilometers above the equator from access points, the Commission can offer additional reassurances by restricting access points from pointing toward the geostationary arc.[13] The Commission can provide further assurances through a properly structured AFC system.[14]

Finally, the minimal risk of any harmful interference is easily outweighed by the quantifiable benefit that potentially 850 MHz of unlicensed spectrum would have in closing the Digital Divide.[15] As demonstrated in Figure 1 above, a 65-meter deployment would cover 40% more area than a 30-meter deployment.

The examples of 65-meter and 90-meter deployments are just that—examples of what higher deployment heights for U-NII-5 and U-NII-7 access points would mean for rural America. To serve the largest number of residents, we urge the Commission to decline to impose any height requirement for U-NII-5 and U-NII-7 access points, at least in rural America. Alternatively, we suggest that the Commission increase the proposed 30-meter maximum deployment height for rural U-NII-5 and U-NII-7 access points to at least 90 meters.

---

[13] NPRM ¶ 56 (Midco further agrees with the Commission that there is a reduced chance of harmful interference from satellites in the U-NII-1 band given the distance at which satellites in the U-NII-5 and U-NII-7 bands operate).

[14] *See* Section 3 *infra* for a discussion of Midco's suggestions on the AFC system.

[15] *See, e.g.*, NPRM ¶ 51 (seeking comment "on whether this estimate of typical standard-power access points is appropriate").

B. THE COMMISSION SHOULD INCREASE THE POWER LIMITATIONS, AT LEAST FOR OUTDOOR CLIENT DEVICES, AND OTHERWISE INSTITUTE RULES TO CONTINUE SPURRING INNOVATION

The beauty of the 6 GHz band, especially the U-NII-5 and U-NII-7 sub-bands, is the technological innovation that can occur when regulations encourage continuing innovation, such as higher power limitations (at least for outdoor client devices in rural America) and no regulation on the types of antennas that operators must use for equipment.[16] With a few alterations to the proposed rules, the Commission can ensure that the U-NII-5 and U-NII-7 bands continue to spur innovation to better close the Digital Divide.

1. The Commission should allow a flexible power limitation of at least 36 EIRP for outdoor client devices to account for highly directional antennas

The Commission has suggested significantly more limited power rules for client devices than for access points with a proposed maximum conducted output power of 63 mW, and a maximum power spectral density of 5 dBm in any 1 megahertz band.[17] If a transmitting antenna with directional gain greater than 6 dBi is used, the maximum power and power spectral density must be reduced by the amount of dBi that the directional gain is greater than 6 dBi.[18] These proposed limitations equate to an EIRP of 24 dBm, while the proposed EIRP for U-NII-5 and U-

[16] *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Proposed Rulemaking, ET Docket No. 18-295 and GN Docket No. 17-183, FCC 18-147, Statement of Commissioner Michael O'Rielly (the "O'Rielly Statement") ("the beauty of unlicensed spectrum is that no one can predict what American innovators and creative geniuses will think up next. It's really up to them to turn our efforts into products, services, and endless possibilities for the benefit of our people.").

[17] NPRM ¶ 76.

[18] *Id.*

NII-7 access points is 36 dBm.[19] In proposing these rules, the Commission has not distinguished between indoor and outdoor client devices, even though the two devices have different purposes.

An indoor client device will likely be a Wi-Fi router, which usually uses an omnidirectional antenna for indoor networking. An outdoor client device in a fixed wireless network, however, has a highly directional antenna and acts in tandem with the outdoor access point to provide connectivity. Therefore, the EIRP for client devices should be at least that allowed for the access point. The proposed rule is also inconsistent with the U-NII-3 rules, and our current U-NII-3 LTE equipment. Our current equipment has a maximum power output of 21 dBm, and a maximum gain of 20 dBi for antennas (although such equipment is software limited to maintain compliance with the Commission's rules). Under the proposed rule, we would have to reduce our maximum power output and/or antenna to be within the 24 dBm EIRP. This reduction would restrict the upload from the client device to the access point such that our service area would be ***reduced by approximately 1/3 of the area*** we could cover if the Commission allowed for at least a 36 dBm EIRP for outdoor client devices.

Instead of needlessly limiting a U-NII-5 or U-NII-7 outdoor client device EIRP to 24 dBm, Midco suggests that the Commission institute at least a 36 dBm EIRP (the EIRP used for U-NII-5 or U-NII-7 access points). We further suggest that the Commission not impose any limitations on power levels for radios, the power spectral density, or the antenna gain, as long as

[19] *See* Section 2 for a discussion on power limitations in the U-NII-5 and U-NII-7 bands in rural America.

the combination of the radio's power and the antenna's gain does not exceed the 36 (or higher) dBm EIRP.[20]

In the fixed wireless world, a highly directional antenna provides for more targeted service. Similar to a laser, the higher the directional gain of the antenna, the more focused the client device is to the access point. A more focused client device reduces the noise in the network, mitigates any risk of harmful interference, and improves the customer experience.

An EIRP of at least 36 dBm also allows us to implement current U-NII-3 equipment in the U-NII-5 and U-NII-7 bands. This provides an immediate and tangible benefit to our rural footprint as we can deploy immediately without waiting for further development of technology. But a higher EIRP also allows flexibility for research and development to, for example, develop an even more spectrally efficient client device, while using a highly directional antenna, to boost upload capacity.

The Commission should institute a flexible EIRP of at least 36 dBm for outdoor client devices in the U-NII-5 and U-NII-7 bands, at least in rural America, to best serve rural residents and encourage further innovation. If the Commission is concerned that increasing the EIRP to at least 36 dBm would pose a risk of harmful interference, the Commission could consider requiring client devices with an EIRP above 24 dBm to register in the AFC system and identify their access point.[21]

---

[20] Our comments on the 36 dBm EIRP are informed by our current network where we deploy directional antennas. We are not commenting on the appropriate EIRP for outdoor omnidirectional antennas.

[21] *See, e.g.*, NPRM ¶ 28 (seeking "comment on whether device registration in the AFC database is necessary.").

2. The Commission should consider a more flexible power limitation for U-NII-5 and U-NII-7 access points

Currently, the power limitation for the U-NII-1 and U-NII-3 bands is a maximum conducted output power of 1W and maximum power spectral density of 17 dBm in any 1 megahertz band.[22] If a transmitting antenna with a directional gain greater than 6 dBi is used, the maximum power and power spectral density must be reduced by the amount of dBi that the directional gain is greater than 6 dBi.[23]

While the proposed power limitations for access points are acceptable to us and the ***current*** generation of our LTE equipment, the ***future*** is unknown. We encourage the Commission to consider allowing higher power for access points (especially in rural America) now, or create a procedure wherein manufacturers, operators, etc. could petition for an exemption or allowance to operate at higher power levels by providing defined technological data to the Office of Engineering and Technology during the certification process.

3. The Commission should not place any restrictions on antennas selected by operators

The Commission seeks comment on whether to "require that antennas be integrated with the device[.]"[24] We strongly believe that operators should be allowed to pick the antennas, especially for access points, to best engineer their network.

Requiring integrated antennas and radios will unnecessarily limit the ecosystem and stifle healthy competition among manufacturers. For example, requiring integrated radios and antennas will artificially and unnecessarily limit the number of manufacturers who are able to

---

[22] NPRM ¶ 76.

[23] *Id.*

[24] *Id.* ¶ 79.

produce both devices. This is especially true in the fixed wireless ecosystem, where radios are significantly more complex than antennas and the pool of manufacturers is smaller. Allowing for a competitive environment wherein manufacturers can compete with one another to develop increasingly spectrally efficient antennas benefits consumers. Allowing non-integrated antennas also allows operators' engineers to build a more spectrally efficient network and reuse spectrum by choosing antennas that have a more limited direction.

To provide guidance to the Commission, however, during the equipment authorization process, we support a requirement for an equipment authorization grantee to provide a list of permissible antennas with its equipment authorization and maintain such information on its website.[25]

C. AN AFC SYSTEM BALANCING THE NEEDS OF NEW OPERATORS WITH PROTECTIONS FOR INCUMBENTS WOULD MOST EFFICIENTLY USE THE U-NII-5 AND U-NII-7 BANDS

Midco supports the Commission's proposal to institute an AFC system for outdoor access points.[26] The AFC system, with a potential of 850 MHz of unlicensed spectrum for operators, can help close the Digital Divide now, and will no doubt increase technological innovation in the future.[27] We believe that the following suggestions would allow the Commission to strike a balance between creating an efficient and easy-to-use AFC system for operators while minimizing any risk of harmful interference.[28]

---

[25] NPRM ¶ 79.

[26] *Id.* ¶ 23.

[27] O'Rielly Statement (acknowledging endless innovation possibilities).

[28] NPRM ¶¶ 25-27.

Centralized AFC System. A centralized database stored in the cloud would be easiest for operators to use.[29] If there is more than one AFC system operator, it is crucial that all AFC system operators are able to communicate with one another to ensure that the most accurate data is being used.[30] Midco supports a multi-stakeholder group, like WInnForum, taking the lead on AFC system certifications with oversight from the Commission.[31] Consistent with the Commission's practice for the Spectrum Access System in the CBRS band, the Commission's Office of Engineering and Technology could test and certify AFC system operator(s).[32] The proposed, renewable term of five years for an AFC operator is acceptable.[33] While some fees for the AFC system's services might be necessary,[34] the Commission should consider limiting the fees that can be charged. Even if a fee might be charged for the initial registration with the AFC system, re-verifications should not be charged any fees. Doing so could deter operators from verifying their equipment and spectrum usage.

Registration of Access Points and Data Collection. The AFC system should receive and record data like that currently collected in the ULS system, including the maximum operator power, azimuth, center channel, beam width of antenna, etc.[35] An AFC system that allows for

---

[29] NPRM ¶ 26.

[30] *Id.* ¶ 33.

[31] *Id.* ¶ 34.

[32] *Id.*

[33] *Id.* ¶ 35.

[34] *Id.* ¶ 36 (questioning whether the AFC system should charge fees).

[35] *Id.* ¶ 25.

search capabilities based on geographic information including state, county, city or township, latitude, and longitude of the access point would be useful for operators.[36]

An AFC system that is capable of pulling technical data from the access point is the most reliable method to verify the use of spectrum and for operators to make the most efficient use of the 6 GHz band.[37] Midco suggests a periodic re-verification by the AFC system from the access point broadcasting device to ensure that the AFC is producing the most recent frequency information upon a query by an operator.[38]

The alternative proposed by the Commission of having operators input data into the AFC system could also be effective, with proper safeguards. This alternative would more resemble the licensed light regulatory system for 3.65 GHz band—a system that has worked well for Midco. If the Commission takes this approach, Midco suggests that professional installers be required, at least for access points deployed above 30 meters, to institute consistent engineering standards. A re-verification process of access points and spectrum usage is important to ensure that the AFC system and operators have the most up-to-date information possible. Operators should be required to re-verify their frequency usage on at least an annual basis to ensure that all spectrum is being efficiently used.[39] During the re-verification process, it is critical that the

[36] NPRM ¶ 25.

[37] *Id.*

[38] *Id.* ¶ 29.

[39] *Id.* ¶ 30.

device is allowed to continue operating as some of these access points will carry VoIP, and the cessation of phone services could be devastating.[40]

No Standard Client Device Registration. While access point registration is essential to a functioning AFC system, registration of a standard client device is not.[41] Due to the control of the client device by the access point, registering each client device is an unnecessary and needlessly time-consuming exercise.

In lieu of registration, Midco supports the Commission's proposal to require client devices to operate under the control of a standard-power access point, which "will help prevent uncontrolled operation of client devices on a peer-to-peer basis that would pose a greater risk of causing harmful interference to microwave links."[42] A standard, maximum operating radius for communications between a standard-power access point and a client device, at least in rural America, should be eight miles.[43]

The exception to this general rule is if the Commission increases, as Midco suggests, the EIRP of outdoor client devices for the U-NII-5 and U-NII-7 bands to a minimum of 36 dBm. In that circumstance, Midco supports a requirement for the client device to be registered, including information relating to the device identifier, location, basic technical information, and the company that deployed the device.[44]

---

[40] NPRM ¶ 30 (questioning whether devices should be allowed to continue operating during the re-verification process).

[41] *Id.* ¶ 27.

[42] *Id.* ¶ 53.

[43] *Id.* ¶ 54.

[44] *Id.* ¶ 28 (seeking information on client device registration).

Frequency Allocation. To ensure the most efficient use of spectrum and to minimize unusable white space, frequency availability should be communicated in a minimum of 20 MHz channels.[45] A 20 MHz channel is consistent with the Commission's 20 MHz channel widths used in the U-NII-1 band.[46] We believe that the AFC system could and should be capable of computing path loss based on three-dimensional locations rather than on contours, which are usually used when the location of one end of a link is not known. As previously discussed, fixed wireless antennas are highly directional such that only one potential path loss computation must be performed for each potential "victim." We currently compute these three-dimensional path losses in our network to protect against self-interference, and an AFC system should be able to compute these as well.[47]

If possible, the AFC system should also calculate a list of available frequencies and the maximum power permitted on each frequency.[48] Providing only the frequency available using the maximum permissible power as suggested could unnecessarily deter operators from using available spectrum to meet consumer needs.[49] Results from an AFC system search should include both the prohibited and available frequencies.[50] It would also be useful to understand the dates of when the prohibited frequencies went into use. Additionally, an optional periodic

---

[45] NPRM ¶ 26.

[46] *Id.* ¶ 78.

[47] *See generally id.* ¶¶ 44-49 (seeking comment on fade path margins, contours, and propagation models).

[48] *Id.* ¶ 26.

[49] *Id.* ("Should the AFC system determine frequency availability using the maximum permissible power for a standard-power access point[?]").

[50] *Id.*

update or web map on which frequencies are being used and are available within the AFC System would be useful.

Incumbent Users. The Commission questions whether there should be a mandatory obligation by incumbent fixed service providers to file or certify their technical data.[51] While Midco agrees that fixed stations have "significant incentives to maintain the continued accuracy of data in ULS,"[52] such stations, like unlicensed operators, should also file their technical data in the AFC system. Temporary fixed operations should be recorded either in ULS or with an AFC system to ensure protection to the fixed station operator.[53] Regardless of the initial registration mechanism, the AFC system must receive the temporary operational information so the system can accurately provide frequencies and power level usage for unlicensed devices.[54]

While the FCC should protect incumbent fixed station operators, the Commission should restrict the fade margins and use propagation models to allow the most unlicensed device use as possible in the 6 GHz band.[55] Midco urges the Commission to adopt the out-of-band emission standards for the U-NII-3 band instead of those for the U-NII-1 and U-NII-2 bands.[56] The U-

[51] NPRM ¶ 39.

[52] *Id.* ¶ 40.

[53] *Id.* ¶ 41 (questioning temporary fixed station operational licensing).

[54] *Id.* ¶ 30.

[55] *Id.* ¶¶ 45-49.

[56] 47 CFR § 15.407(b)(4)(i) ("All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.").

NII-3 rules have made that band the most widely used of the 5 GHz bands to deliver fixed wireless, and the Commission should institute similar rules in the U-NII-5 and U-NII-7 bands.

III. CONCLUSION

With a few changes, the U-NII-5 and U-NII-7 bands can become the new spectrum heavy lifters to close the Digital Divide in rural America. Most importantly, the Commission should take two actions on the U-NII-5 and U-NII-7 bands, at least in rural America: (1) either abolish the proposed 30-meter access point height restriction, or increase the height limitation to at least 90 meters; and (2) increase the EIRP for outdoor client devices to at least 36 dBm. These suggestions, taken with our other suggestions herein, would create a real, meaningful step toward closing the Digital Divide.

February 15, 2019

Respectfully submitted,

MIDCONTINENT COMMUNICATIONS

/s/ Nicole Tupman

Nicole Tupman
Assistant General Counsel
3901 N. Louise Ave.
Sioux Falls, SD 57107
(605) 275-6610
nicole.tupman@midco.com

Figure 2, included in our comments, shows the following simplified diagram on how a higher access point deployment would provide better line-of-sight between the access point and the client device, which would increase upload capacity and boost speeds for our customers.

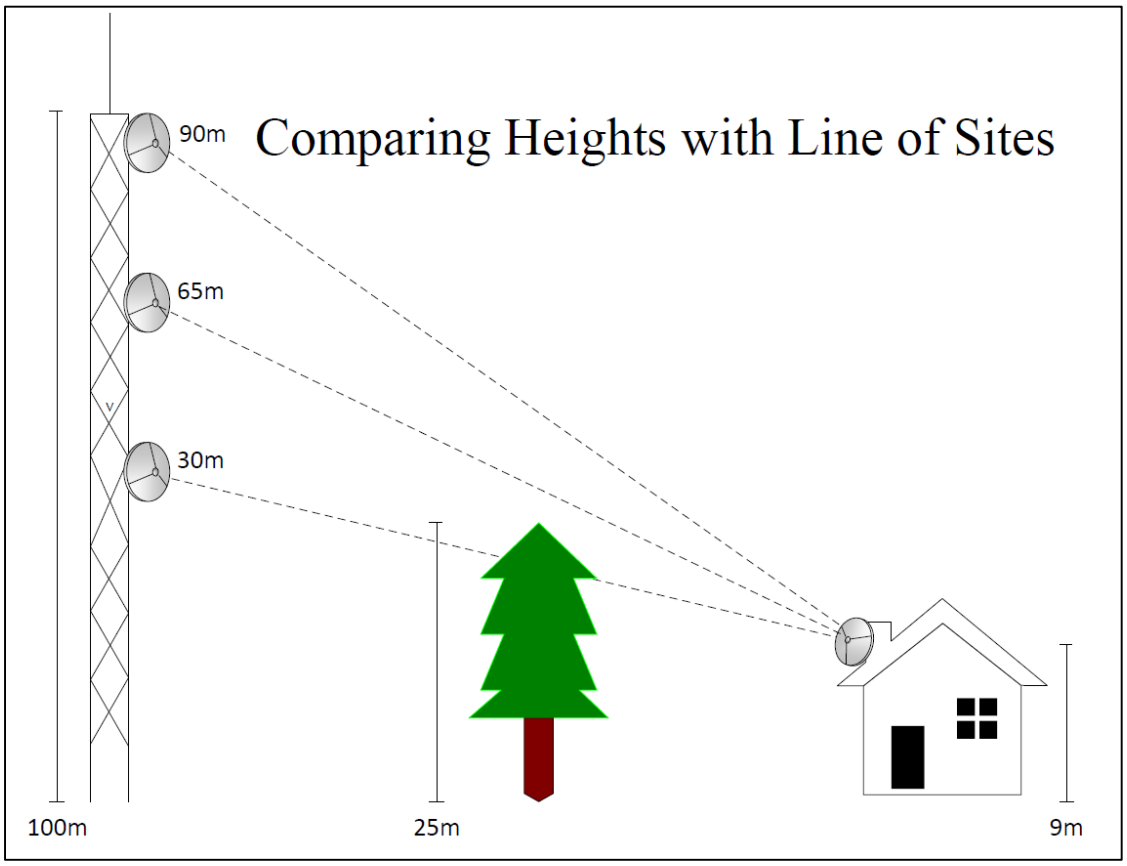

Figure 1: Simplified Path Analysis Models from Appendix 1

The following data shows our path analyses at deployment heights of 30m, 65m, and 90m for the same home connected to our Thompson, ND grain elevator point of presence. For Figures 2A, 2B, and 2C, we assumed a 9m client device install height. A 9m install could either be a standard install on a 2 ½ story home where the home is tall enough to mount the device to the home (an increasingly uncommon phenomenon), or a special install for a shorter home, which would require the device to be installed on a tripod with a 10-foot mast. Special installs

are more expensive and time-consuming, and customers prefer a standard install whenever possible.

As shown in Figure 2A, a 30-meter deployment height would not allow us to serve this customer, even though the customer is only 1.73 miles from the elevator. The path analysis specifically instructs that at least a 60m height be used instead. Either the 65m deployment (Figure 2B) or the 90m deployment (Figure 2C), however, would allow us to serve this customer, and the additional surrounding customers.

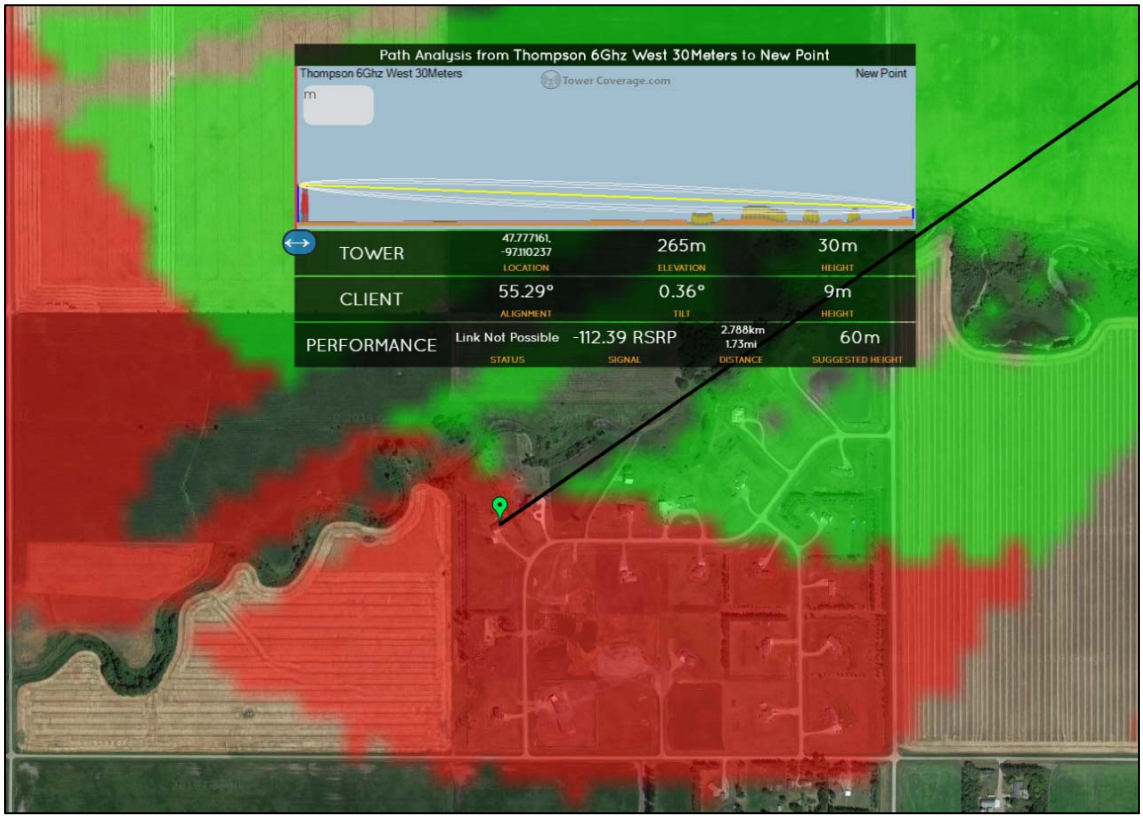

Figure 2A: Path Analysis Model for an Access Point Deployment at 30m and a Client Device Installation at 9m (red shows unserviceable areas, and green shows serviceable areas)

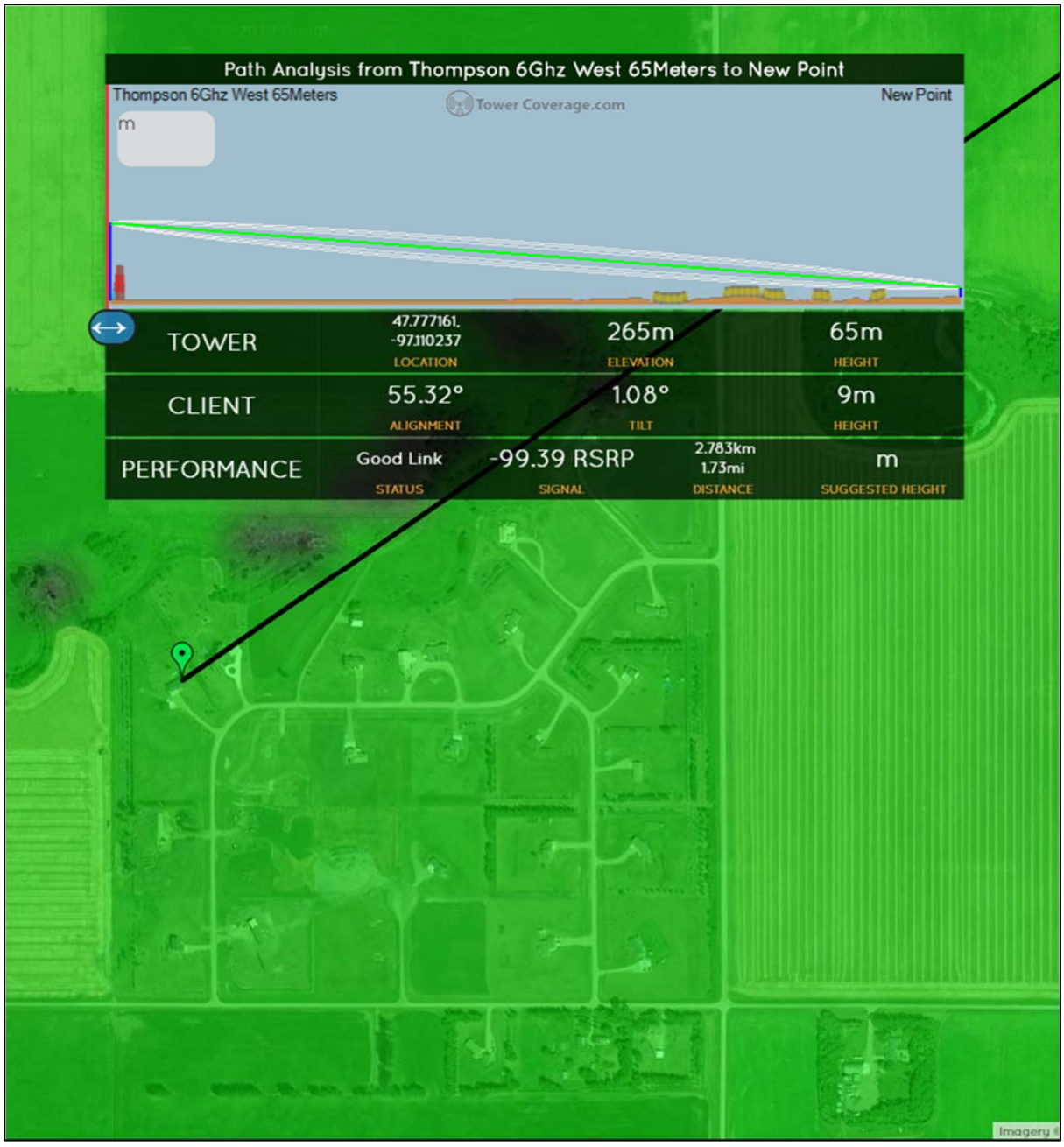

Figure 2B: Path Analysis Model for an Access Point Deployment at 65m and a Client Device Installation at 9m (green shows serviceable areas)

Figure 2C: Path Analysis Model for an Access Point Deployment at 90m and a Client Device Installation at 9m (green shows serviceable areas)

Our customers prefer standard installs of client devices on their homes, and we prefer to complete these less-intrusive and more aesthetically-pleasing installs whenever possible. Figures 2D and 2E assume a client device deployment height of 6m, a more typical install height. A 90m access point deployment height would not only allow for standards installs, it would also

provide for a larger service area at the 6m client device installation height. Furthermore, as discussed in Section I(A), a 90m access point deployment height would provide for a more focalized tilt, increasing upload capacity and speeds for the customer, and minimizing any risk of harmful interference.

Figure 2D: Path Analysis Model for a 65m Access Point Deployment and a 6m Client Device Installation (red shows unserviceable areas, and green shows serviceable areas)

Figure 2E: Path Analysis Model for a 90m Access Point Deployment and a 6m Client Device Installation (green shows serviceable areas)